Policy Report: How to Reduce Gas Consumption Among Poor Households

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CONTENTS

SUMMARY

- The use of gas for residential use in Ukraine accounts for nearly half of all gas use. Nevertheless, it is not used as efficiently by Ukrainian residential customers as itt is by residential customers in other countries. A major cause of the inefficient use of gas is the lack of meters in apartments and homes. Although about 10 million households receive gas service, including nearly 4 million that use natural gas for heating their homes, there are only about 1..7 million gas meters is use. In the City of Kiev, for example, 29,900 homes are heated with gas but only 9,000 of these homes have gas meters.
- Households that do not use meters pay for gas based on normatives. Analysis by PADCO of consumption of natural gas for heating purposes shows that average actual consumption of natural gas is significantly lower than official consumption norms.[1] These households, therefore, pay unreasonably high monthly payments. For households receiving housing subsidies, this "overpayment" for gas actually used means that local budgets spend more in payments to local gas providers than would be the case if all households were metered.
- Results of PADCO's study indicate that an average household enrolled in the HSP consumes monthly between 6.7 m^3 and 6.8 m^3 of gas per square meter of living space. The average per capita consumption of natural gas for heating and cooking with and without heating water ranges from 13.0 m^3 to 13.9 m^3 and from 16.5 m^3 to 18.5 m^3, respectively.
- Households that installed gas meters reduce their gas consumption by between 22.76% to 29.22% of gas. If all households that heat there homes with gas were to install meters, there would be savings of between 23.09% and 28.60% of total budget funds allocated for housing subsidies.
- Total monthly values of subsidies due between July 1997 and June 1998 (excluding subsidies for natural gas) ranged from between 55 million hrn to 65 million hrn.
- During the heating season (between October and April) total monthly values of subsidies due ranged from 97.5 million hrn to 99.9 million hrn. In October and April, they fell to between 70 million hrn and 80 million hrn because, in some regions of Ukraine, the heating season lasts from mid October through mid April.
- The total value of subsidies due during the 1997-98 heating season was around 581,636.33 thousand hrn. If all households enrolled in the HSP had installed gas meters it would have been reduced to between 415.3 million hrn and 447.3 million hrn. This would save between 134.3 million hrn and 166.3 million hrn of state budget funds annually.

[1] The PADCO analysis is based on data provided to housing subsidy offices by housing subsidy recipients in Kam'yanets-Podilsky raion of Khmelnytska oblast and Yahotinsky raion of Kyivska Oblast.

1. WHY UKRAINE MUST ENCOURAGE THE INSTALLATION OF GAS METERS

1.1 GAS AND OIL ACCOUNT FOR NEARLY ONE HALF OF ALL UKRAINE'S IMPORTS

In 1998, Ukraine used about 80 billion cubic meters (m3) of natural gas –of which 90 percent is imported from either Russia or Turkmenistan.[2] The rapid increase in energy prices from 4-5 percent of the world price seven years ago to almost parity with world prices today has exerted an enormous stress on industry, on communal service enterprises, and on Ukraine's balance of payments. Over one-half of the value of Ukraine's imports in 1995 were of natural gas or oil. Ukraine receives about 30 billion m^3 of natural gas from Russia as payment for the transit of Russian gas for European customers through Ukraine. With the completion of pipelines that bypass Ukraine, however, this payment will begin to decline. Therefore, Ukraine faces a growing problem of paying for its huge imports of energy. As much as one half of Ukraine's hard currency received from foreign credits and from exporting goods is used to pay for the nation's energy imports.[3]

Finding ways to reduce energy consumption is therefore vital if Ukraine is to reduce its growing indebtedness and to be able to use its foreign currency to import modern equipment and technology to rebuild its shattered industrial and agricultural sectors. Fortunately, there are many opportunities to reduce energy consumption because Ukraine uses energy inefficiently in all sectors of the economy.

1.2 UKRAINE USES ENERGY INEFFICIENTLY

Most industrial and urban development in the former Soviet Union was predicated on the availability of cheap natural gas and oil. Without strong incentives for customers to conserve energy, energy consumption per unit of manufactured production in Ukraine is from three to four times higher than at similar enterprises in Western Europe.[4]

The residential sector accounts for about one half of all gas consumed in Ukraine.[5] It also uses energy inefficiently. Nine out of ten urban homes are supplied with central heating, 80.2% with hot water, and 86% with natural gas. Central heating systems for residential buildings use 70-80 million tons of conventional fuel every year. Heating one square meter of apartment space in Ukraine costs 1.5 times more in energy resources than in the USA and 2.5-3.0 times more than in Sweden.[6]

Experience of industrialized countries shows that current technologies allow a reduction of energy use for residential buildings by more than one-third. Heat loss from residential buildings can be effectively lowered by installing thermal insulation in buildings and modernizing heat supply systems. To achieve these

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[2] See *Ukrainian Economic Outlook, December 1998*, The Agency for Humanitarian Technologies, Kiev, 1998.

[3] In fact, Ukraine purchases its gas through a mixture of hard currency payments and barter. The agreement between Turkmenistan and Ukraine for the provision of gas for 1999, for example, specifies that 50% of the costs will be paid through the delivery of goods, 10% through the provision of construction services, and 40% in hard currency. Despite attempts to use barter, however, the GOU is often forced to spend hard currency. In 1995, the Cabinet of Ministers reported that 85% of the hard currency it received from the IMF would be used to pay energy import debts.

[4] In 1990, per capita energy consumption -- expressed in kilograms of oil equivalent -- was about equal to per capita consumption in other industrial countries: 4600 kg petroleum equivalent. But Ukraine's gross domestic product (GDP) per capita was only about 15 percent of 20 percent of the European average western European nation. Energy consumption per unit of GDP was, therefore, 8-10 times higher than in Western Europe.

[5] See *Habitat: 1996*, Report prepared by the United Nations Development Program, Kiev, 1996

[6] *Habitat*, Op. Cit.

goals, Ukraine introduced new construction standards in 1994 to reduce heat loss through walls by up to 66 percent and through windows by 20%-40%. But to encourage the widespread adoption of these technologies by the owners and occupants of residential structures, it is necessary to install meters.

1.3 THE BEST WAY TO ENCOURAGE GAS CONSERVATION IS TO INSTALL GAS METERS

The regulation of new construction will affect gas use only slowly because of the very slow rate of new construction in Ukraine. The most important way to encourage households to conserve energy is through the installation of gas meters. When households pay according to how much gas they actually consume, rather than on the basis of normatives, they have a strong incentive to find cost-effective ways to reduce energy consumption. In the Baltic States, for example, average residential use of gas fell by more than 30% after the installation of gas meters.[7] The analysis described in the following section of this report suggests that a similar level of savings will be possible in Ukraine.

The importance of gas meters as a way to encourage gas conservation is well understood by the Government of Ukraine. In December 1997, the GOU signed an agreement with the European Bank for Reconstruction and Development under which the latter would provide credits of $80 million and a technical assistance grant of $2.4 million to support the installation of gas meters in Ukrainians homes and apartments. Progress on implementing this program, however, has been slow. The necessary legislation was not submitted to the Supreme Rada until September 1998, and, by February 1999 had passed only one reading.[8]

Assistance in financing gas meter installation is especially important for low-income households. Purchasing and installing a gas meter may cost a family nearly $100. This sum that is beyond the means of poor households, even though the "pay-back" -- in terms of saved gas consumption -- will be less than one year for most households that use gas for heating. But low-income households that receive housing subsidies would not receive any financial reward from installing meters.

1.4 HOUSING SUBSIDIES ELIMINATE SUBSIDIES FOR INSTALLING METERS

Under the procedures for calculating subsidies in effect during 1998, any reduction in gas consumption would reduce payments from the housing subsidy program to local gas suppliers. These payments are financed from local budgets. This system creates no incentive for the family to install meters: purchase and installation is paid in full by the family while the benefits of reduced gas consumption is enjoyed, entirely, by local budgets – at least for as long as the family continues to receive housing subsidies. PADCO technical assistance experts working with local housing subsidy offices have been told of many instances of households complaining that they will not install meters under these circumstances.

The issue has become very important since the Cabinet of Ministers issued Decree 619 in June 1996 (discussed in detail in Attachment 1). This decree changed the normatives for gas used for home heating. Previously, households paid the same normative per square meter of living space throughout the year. Decree 619 required them to pay for gas only during the seven month heating season -- as well as increasing by nearly 30 percent the total amount of gas for which households pay each year. Therefore, participation in the housing subsidy program now fluctuates – falling during the summer and rising again in the winter. In

[7] World Bank, aide memoire, 1996.

[8] Several factors account for the delay. During 1998, the Supreme Rada voted against receiving several credits (and even one grant!) from international organizations. At the same time, the GOU is concerned about the rising level of indebtedness to international donors. And, within Ukraine, newspapers report heated debates between gas companies and the manufacturers of gas meters (*Golos Ukraina*, August 11, 1998). The latter are opposed to the importation of gas meters that would occur if foreign credits for gas meter installation were accepted.

summer months, an average of about 2.4 million households receives subsidies; in the winter, the average rises to 3.2 million households. Most of the 800,000 extra households receiving subsidies in the winter use gas for heating homes. Very few have installed meters.

1.5 OUTLINE OF REPORT

Recognizing that the procedures for calculating housing subsidies was discouraging the installation of gas meters, in December 1998, the Cabinet of Ministers of Ukraine issued an instruction to the Ministry of Labor and Social Policy to develop mechanisms within the housing subsidy program to encourage gas conservation through the installation of meters.

At the request of the Ministry, PADCO has analyzed the use of gas among households and prepared recommendations for providing incentives for low-income households to install gas meters through the housing subsidy program. The report is divided into two parts: the first describes savings in gas consumption and reductions in the cost of subsidies that would result from the installation of meters by low-income households. The second part describes ways in which the procedures for calculating subsidies could be changed to provide incentives for meter installation.

PART I: SAVINGS FROM THE INSTALLATION OF GAS METERS

Part 1 of the report estimates the savings in gas consumption and in payments for housing subsidies that would result from the installation of gas meters by households receiving subsidies. Little is known about how much gas households actually consume on Ukraine nor about how this varies according to family structure, appliances owned, type of residence and regional location. Systematic records are not maintained by UkrGaz or by local gas retailers. Recognizing this gap, the Cabinet of Ministers authorized, in July 1998, a pilot program to collect and analyze gas consumption data to be carried out in Zaphorizka Oblast, beginning in September 1998.[9] The results of this study, however, will not be available until the summer of 1999.

The issue of encouraging gas conservation, however, is urgent. Therefore, in December 1998, the Cabinet of Ministers issued an instruction to the Ministry of Labor and Social Policy. To support the Ministry in completing this task, PADCO prepared a special analysis of gas consumption using data maintained by local housing subsidy offices.

The analysis is performed in three stages – reported in the following three sections of this report. PADCO has used two databases from housing subsidy offices to make estimates. The first database, discussed Section 2 of this report, is from two raion housing subsidy offices where a large number of households have installed gas meters. These data are used to estimate actual gas use by households for home heating, heating water, and cooking. Housing subsidy offices maintain these data because households must show their actual gas use to staff in housing subsidy offices in order to allow the offices to recalculate payments to local gas providers. The housing subsidy offices maintain, on computer, records of actual gas consumption by households. The data from these two raions cannot be used to make projections of the total use of gas among households receiving housing subsidies because these two raions are not typical of the nation as a whole. Therefore, PADCO performs a second analysis based on a representative sample of households.

The second database, from 32 housing subsidy offices that participate in a pilot reporting program, is used to estimate what share of housing subsidies may be attributable to payments for gas for home heating, and water heating. The pilot raion database includes 66,000 households for whom data on actual level of services used is recorded. The results of these estimates of nationwide use of gas and the cost of the related housing subsidies is reported in Section 3, below. The overall estimates of nationwide savings in billable

[9] Decree of the Cabinet of Ministers #1131, "About Introduction of Special Procedure for Calculation of Consumption of Natural Gas in Zhaporiska Oblast," July 22, 1998

gas consumption and in the cost of housing subsidies allocated in reported in Section 4 – the final section of Part I of this report.

2. CONSUMPTION OF NATURAL GAS BY HOUSEHOLDS RECEIVING HOUSING SUBSIDIES WITH GAS METERS

2.1 DATABASE FOR PADCO ANALYSIS OF GAS CONSUMPTION BY INDIVIDUAL HOUSEHOLDS

PADCO's first task was to identify how much gas households use to heat their homes, heat water and cook food and to compare actual consumption – as recorded on gas meters – with the normatives (per square meter and per person) used as the basis for billing households without meters.

PADCO selected housing subsidy databases maintained by two raions -- Kam'yanets-Podilsky raion (Khmelnytska oblast) and Yahotinsky raion (Kyivska oblast) – as the basis for this analysis. Both are rural raions and most households in these raions have installed meters for their supplies of natural gas. The databases maintained by the local HSOs include not only the cost of services but also detailed information on the types and volume of services provided.

Subsidies are initially calculated based on normatives (per m2 of heating space for gas used for heating and per capita for gas used for heating water and cooking. At the completion of the heating season, however, these raions matched actual consumption of metered natural gas by households with data on consumption included in each record in their databases (using the NASH DIM software program developed for the housing subsidy program by PADCO). Households are required to submit their metered gas billing to the housing subsidy offices at the end of the heating season. The housing subsidy offices then recalculated subsidies and requested the return of overpayments of subsidies to gas providers caused by the fact that actual, measured consumption was less than the normatives.

The analysis shows that the average household (in both raions) used between 6.7 m^3 and 6.8 m^3 of natural gas for home heating per m^2 of heating space. This is below the normative of 11 m^3 of natural gas for home heating per m^2. Per capita use of natural gas for heating and cooking (without heating water) is between 13.0 m^3 to 13.9 m^3. This is also below the normative of XXXX. Per capita use of natural gas for heating, cooking, and heating water is 16.5 m^3 to 18.5 m^3. These totals are below the normatives for which unmetered households are charged for gas. This is also below the normative of XXX.

2.2 ACTUAL CONSUMPTION OF GAS IN THE 1997-98 HEATING SEASON

The PADCO Computer Center studied consumption of natural gas for heating purposes by enrolled households based on information in housing subsidy databases of Kam'yanets-Podilsky raion in Khmelnytska oblast and Yahotinsky raion in Kyivska oblast for the 1997-98 heating season.

On November 1, 1998, there were 1,975 records in the database maintained by the housing subsidy office in Kam'yanets-Podilsky raion. Of this total, 1,132 households used gas for home heating. Of these, 781 households were equipped with gas meters. (This is a much higher incidence of metering than is typical in other raions reviewed by PADCO).[10]

[10] We were not able to analyze consumption of gas for cooking by households whose housing was received central heating since only one such household had installed a gas meter.

The total amount of subsidies for natural gas -- metered and unmetered -- during the heating season was 388,946.21 Hrn. Data on actual gas consumption was verified using actual billing information from metered households during June through September 1998. Table 2.1 shows the results of these analyses.

Table 2.1: Value of Actual Gas Consumption in the Heating Season of 1997-1998 in Kam'yanets-Podilsky Raion

	Gas consumed (m^3)	*Subsidies for gas, Hrn.*
Subsidies due for the heating season	3,556,211.25	351,013.17
Gas actually consumed	2,746 854.22	269,972.45
Gas saved (funds returned)	809,357.03	81,040.72

In Kam'yanets-Podilsky raion, therefore, the fact that many households had installed meters reduced the volume of gas for which households paid by 809,357 m^3 (22.76 percent) below what would have been estimated had households been billed according to normatives. Because households consumed less gas, the housing subsidy program paid smaller subsidies to participating households. The reduction in the costs of the subsidy program in that raion was 81,040.72 hrn (23.09 percent).

Similar calculations were made for the housing subsidy database of Yahotinsky raion (Kyivska oblast). On October 1, 1998, there were 10,310 records in the database; 6,649 households used natural gas for home heating, of which 4,298 apartments/houses were equipped with meters and 2,351 households were not metered. The value of gas consumption and housing subsidies for gas this raion are shown in Table 2.2. In Yahotinsky raion, 29.22 percent of gas and 28.60 percent of subsidy funds were saved because billing was based on actual consumption rather than on normatives.

Table 2.2: Actual Gas Consumption during the 1997-998 Heating Season in Yahotynsky Raion

	Gas consumed (m^3)	*Subsidies for gas, Hrn.*
Subsidies due for the heating season	14,297,662,22	1,381,142.72
Gas actually consumed	10,120,303.14	986,113.12
Gas saved (funds returned)	4,177,359.08	395,029.62

2.3 ESTIMATED AVERAGE ACTUAL GAS CONSUMPTION FOR DIFFERENT PURPOSES

During the October 1997 - April 1998 heating season, subsidies were originally granted and calculated based on the following consumption normatives:

- 11 m^3 per 1 m^2 of heated floor area within consumption norms;
- 18.3 m^3 per household member for cooking;
- 23.6 m^3 per household member for cooking and heating water

To estimate the average actual consumption of natural gas, we distinguished two categories of households:

- Households using natural gas for heating and cooking; and
- Households using natural gas for heating, cooking, and heating water;

Our goal was to estimate the volume of gas used for heating housing and that used for cooking and heating water by enrolled households whose subsidies were based on established norms. The same indicators were measured for the actual volume of gas consumed based on the relationship between gas used for heating and that gas used for cooking and heating water. By calculating the total heated floor area and total number of persons we determined actual monthly consumption of gas per 1 m^2 of heated floor area and per capita gas consumption for (a) cooking and (b) cooking and heating water combined. The results we ob-

tained are shown in Table 2.4 (data on heating and cooking) and Table 2.5 (data on heating, cooking, and heating water). Data on Yahotynsky raion of Kyivska oblast are compiled in Tables 2.6 and 2.7, respectively.

To estimate actual gas consumption for heating per m^2 of floor area unit and for cooking and heating water per household member, we disaggregated the volume of gas used into two components: 1)gas used for heating (based on heated floor area) and 2) gas used for cooking and heating water (based on household size). This disaggregation in was done by assuming that the relative shares for these two purposes was in the same proportion as the ration established in current normatives (11 m^3 per m^2 of heating space for heating to 18.3 m^3 per capita for cooking or 11 m^3 per m^2 of heating space for heating to 23.6 m^3 per capita for cooking and heating water). The results are shown in Table 2.3.

Table 2.3: Average Consumption of Natural Gas for Heating, Cooking, and Heating Water (m^3)

		Kam'yanets-Podilsky raion	*Yahotynsky raion*
1.	**Heating + cooking only** (number of households)	609	3,396
	Gas consumption for heating per 1 m^2 (in m^3)	6,696	6,808
	Per capita gas consumption for cooking, (in m^3)	13,939	13,050
2.	**Heating + cooking + heating water** (number of households)	138	81
	Gas consumption for heating per 1m^2 (in m^3)	5,686	6,437
	Per capita gas consumption for cooking + heating water (in m^3)	18,446	16,492

We used the maximum values of indicators during the heating season (data change on a monthly basis). The number of households using natural gas for heating, cooking, and heating water in Yahotynsky raion was smaller than that in Kam'yanets-Podilsky raion. The databases show that 64.64 percent and 68.99 percent of enrolled households used natural gas for heating installed gas meters in Yahotinsky and Kam'yanets-Podilsky raions, respectively.

The small number of subsidy recipients and the low level of natural gas consumption in Yahotynsky raion in April 1998 reflects the early end of the heating season. As they reduced use of natural gas, some households lost their eligibility for housing subsidies and other households were granted subsidies based on half consumption norms. For this reason, we did not include data on Yahotynsky raion for April 1998 in the aggregate data.

The following variables were used in the estimation formulae:

Vn Volume of gas estimated based on normatives;
Von Volume of gas estimated based on normatives for heating;
Vpn Volume of gas estimated based on normatives for cooking (and not for heating water);
Vqn Volume of gas estimated based on normatives for cooking plus heating water;
Va Volume of gas actually consumed;
Vo Volume of gas actually consumed for heating purposes;
Vp Volume of gas actually consumed for cooking (and not for heating water);
Vq Volume of gas actually consumed for cooling and heating water

Indicators were calculated by the following formulae:

Vo=(Va x Von)/Vn Formula for calculating the volume of gas actually consumed for heating;
Vp=(Va x Vpn)/Vn Formula for calculating the volume of gas actually consumed for cooking;

Vq=(Va x Vqn)/Vn	Formula for calculating the volume of gas actually consumed for cooking and heating water;
Go= Vo / Sa	Calculated actual norm of gas consumption per 1 m^2;
Gp= Vp / Na	Calculated actual per capita norm of gas consumption for cooking;
Gq= Vq / Na	Calculated actual per capita norm of gas consumption for cooking and heating water.

Note that actual average gas consumption per square meter is determined for the total heated floor area rather than the area for which housing subsidy is granted (within consumption norms).

Discrepancies in values of actual gas consumption per floor area unit with and without water heaters are caused by inadequacy of consumption norms for cooking with and without water heaters.

Table 2.4: Estimated Consumption Norms for Natural Gas for Heating and for Cooking (and not for Heating Water) Calculated for Kam'yanets-Podilsky Raion in Khmelnytska Oblast

		October 97	*November 97*	*December 97*	*January 98*	*February 98*	*March 98*	*April 98*
Number of households		391	489	543	583	609	607	603
Number of persons	N	1,112	1,430	1,610	1,745	1,836	1,825	1,822
Normative housing floor area	Sn	23,480.20	29,917.60	33,597.00	36,140.44	37,797.70	37,608.30	37,479.50
Total heated floor area	Sa	30,205.37	37,922.37	42,495.57	45,554.41	47,523.57	47,424.37	47,186.27
Total normative volume of gas	Vn	278,631.80	355,262.60	399,030.00	429,478.34	449,373.50	447,088.80	445,617.10
Normative volume of gas for heating	Von	258,282.20	329,093.60	369,567.00	397,544.84	415,774.70	413,691.30	412,274.50
Normative volume of gas for cooking	Vpn	20,349.60	26,169.00	29,463.00	31,933.50	33,598.80	33,397.50	33,342.60
Volume of gas actually consumed	Va	215,011.44	273,379.19	307,825.24	330,884.29	345,474.04	343,761.32	341,912.10
Volume of gas actually consumed for heating	Vo	199,462.34	253,433.14	285,322.39	306,538.00	319,912.53	318,372.24	316,619.06
Volume of gas actually consumed for cooking	Vp	15,549.10	19,946.05	22,502.85	24,346.29	25,561.51	25,389.08	25,293.04
Average natural gas consumption for heating per 1 m^2 of heating space	Go	6.60	6.68	6.71	6.73	6.73	6.71	6.71
Average per capita natural gas consumption for cooking	Gp	13.98	13.95	13.98	13.95	13.92	13.91	13.88

Table 2.5: Estimated Consumption Norms for Natural Gas for Heating and for Cooking and for Heating Water Calculated for Kam'yanets-Podilsky Raion in Khmelnytska Oblast

		October 97	*November 97*	*December 97*	*January 98*	*February 98*	*March 98*	*April 98*
Number of households		117	132	137	137	138	138	137
Number of persons	N	354	395	412	415	417	420	419
Normative housing floor area	Sn	8,100.90	9,059.60	9,362.10	9,402.20	9,454.70	9,517.70	9,486.20
Total heated floor area	Sa	12,533.90	13,932.90	14,355.30	14,360.70	14,290.70	14,326.00	14,276.00
Total normative volume of gas	Vn	97,464.30	108,977.60	112,706.30	113,218.20	113,842.90	114,606.70	114,236.60
Normative volume of gas for heating	Von	89,109.90	99,655.60	102,983.10	103,424.20	104,001.70	104,694.70	104,348.20
Normative volume of gas for cooking	Vqn	8,354.40	9,322.00	9,723.20	9,794.00	9,841.20	9,912.00	9,888.40
Volume of gas actually consumed	Va	77,108.26	86,765.36	89,204.11	89,521.94	89,265.21	89,211.25	88,864.75
Volume of gas actually consumed for heating	Vo	70,537.61	79,403.12	81,568.88	81,837.82	81,599.83	81,543.62	81,219.22
Volume of gas actually consumed for cooking	Vq	6,570.65	7,362.24	7,635.23	7,684.12	7,665.38	7,667.63	7,645.53
Average natural gas consumption for heating per 1 m^2 of heating space	Go	5.63	5.70	5.68	5.70	5.71	5.69	5.69
Average per capita natural gas consumption for cooking	Gq	18.56	18.64	18.53	18.52	18.38	18.26	18.25

Table 2.6: Estimated Consumption Norms for Natural Gas for Heating and for Cooking (and not for Heating Water) Calculated for Yahotynsky Raion of Kyivska Oblast

		October 97	*November 97*	*December 97*	*January 98*	*February 98*	*March 98*	*April 98*
Number of households		2,966	3,087	3,255	3,360	3,396	3,337	333
Number of persons	N	6,428	6,733	7,276	7,544	7,656	7,526	1,000
Normative housing floor area	Sn	168,495.64	175,297.23	186,129.83	192,321.26	194,570.34	190,949.48	20,495.43
Total heated floor area	Sa	193,641.32	201,568.32	213,918.21	221,116.61	223,559.11	219,438.01	23,695.20
Total normative volume of gas	Vn	1,971,084.44	2,051,483.43	2,180,578.93	2,253,589.06	2,280,378.54	2,238,170.08	243,731.43
Normative volume of gas for heating	Von	1,853,452.04	1,928,269.53	2,047,428.13	2,115,533.86	2,140,273.74	2,100,444.28	225,449.73
Normative volume of gas for cooking	Vpn	117,632.40	123,213.90	133,150.80	138,055.20	140,104.80	137,725.80	18,281.70
Volume of gas actually consumed	Va	1,392,163.03	1,454,269.83	1,548,766.75	1,605,715.73	1,631,024.71	1599,859.81	131,828.17
Volume of gas actually consumed for heating	Vo	1,308,913.89	1,366,696.42	1,453,928.56	1,507,065.85	1,530,568.65	1501,185.50	121,850.18
Volume of gas actually consumed for cooking	Vp	83,249.14	87,573.41	94,838.19	98,649.88	100,456.06	98,674.31	9,977.99
Average natural gas consumption for heating per 1 m^2 of heating space	Go	6.76	6.78	6.80	6.82	6.85	6.84	5.14
Average per capita natural gas consumption for cooking	Gp	12.95	13.01	13.03	13.08	13.12	13.11	9.98

Table 2.7: Estimated Consumption Norms for Natural Gas for Heating and for Cooking and Heating Water Calculated for Yahotynsky Raion of Kyivska Oblast

		October 97	*November 97*	*December 97*	*January 98*	*February 98*	*March 98*	*April 98*
Number of households		64	68	74	81	78	74	4
Number of persons	N	177	191	210	234	226	214	10
Normative housing floor area	Sn	4,179.94	4,416.44	4,824.91	5,294.39	5,109.89	4,815.89	269.75
Total heated floor area	Sa	5,069.40	5,340.40	5,892.40	6,385.40	6,200.40	5,821.40	298.50
Total normative volume of gas	Vn	50,156.54	53,088.44	58,030.01	63,760.69	61,542.39	58,025.19	3,203.25
Normative volume of gas for heating	Von	45,979.34	48,580.84	53,074.01	58,238.29	56,208.79	52,974.79	2,967.25
Normative volume of gas for cooking	Vqn	4,177.20	4,507.60	4,956.00	5,522.40	5,333.60	5,050.40	236.00
Volume of gas actually consumed	Va	35,328.65	37,100.46	41,260.85	45,914.37	43,700.71	40,919.44	1,719.63
Volume of gas actually consumed for heating	Vo	32,424.97	34,002.86	37,784.46	41,982.13	39,961.02	37,404.12	1,592.63
Volume of gas actually consumed for cooking	Vq	2,903.68	3,097.60	3,476.39	3,932.24	3,739.69	3,515.32	127.00
Average natural gas consumption for heating per 1 m^2 of heating space	Go	6.40	6.37	6.41	6.57	6.44	6.43	5.34
Average per capita natural gas consumption for cooking	Gq	16.40	16.22	16.55	16.80	16.55	16.43	12.70

3. ANALYSIS OF COSTS OF SUBSIDIES FOR NATURAL GAS BASED ON 32 PILOT RAIONS

3.1 INTRODUCTION

The preceding section analyzed consumption of gas for home heating and water heating by households receiving housing subsidies in two raions. This section uses data from 32 pilot raions to determine consumption of natural gas by housing subsidy recipients and the natural gas portion in the total value of housing subsidies.[11] This database is used to estimate: 1) the portion of the total cost of housing subsidies that reflects the costs of natural gas for home heating and water heating; and 2) the potential savings in gas use and in the cost of housing subsidies that would result from the installation of gas meters.

Most households (up to 70 percent of all Ukrainian households) do not meter gas consumption. They pay, therefore, according to normatives established by Decree of the Cabinet of Ministers.[12] These unmetered households pay for more gas than they actually use, and, certainly, they use more gas than would be the case if they were to install meters and be required to pay for gas according to the volume actually used. Consequently, both households and local budgets spend (the latter – in the form transfers to gas providers to cover housing subsidies) for gas that is not actually consumed.

3.2 CHARACTERISTICS OF DATABASE FROM 32 PILOT RAIONS

Not all housing subsidy offices – even those in the pilot raion reporting project – maintain information on the level of services used by households applying for and receiving subsidies. The NASH DIM software program developed by PADCO for the Ministry of Labor and Social Policy allows detailed information to be maintained by local offices, but many local offices have chosen not to use the full capacities of the program. Of the 221,883 households enrolled in the housing subsidy program in the 32 pilot raions in June 1998, data on housing and communal services consumed were maintained for only 66,915 households. Data on consumption of liquid gas and solid fuel was registered with 6,249 households, and, for 153,840 households, no data on individual services were maintained. Note that some households receive subsidies for both housing and communal services and liquid gas and solid fuel.

Data on consumption of housing and communal services and values of subsidies granted between July 1997 and June 1998 is shown in Table 3.1. This table separates the total value of subsidies for communal services from data on natural gas consumption.[13] Chart 3.1 (derived from Table 3.1) shows monthly values of total subsidies and subsidies for natural gas in the pilot raions database. The dotted line shows total subsidies excluding those granted to cover the costs of natural gas due. The value of monthly subsidies due between July 1997 and June 1998 (without subsidies for natural gas) ranged between 2.0 million hrn and 2.5 million hrn.

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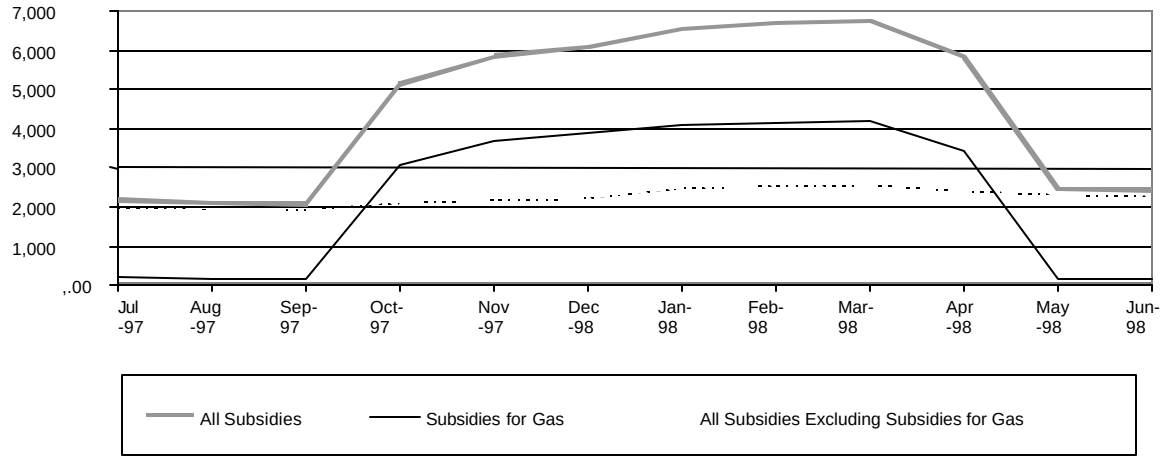
[11] For a description of the pilot raions , see PADCO *Statistical Bulletins*, various issues,

[12] SOURCE???

[13] The data were compiled according to records of payments to communal services contractors. As a rule, there are UkrGas contractors providing natural gas for heating in each raion. Therefore, our task was reduced to identification of a natural gas provider in each pilot raion, calculation of values of subsidies granted and numbers of subsidy recipients. Gas providers were easy to identify by searching the pilot raions database by name (for example, KhmelnytskGas, TernopilGas , KyivOblGas, DonetskOblGas etc.). Correctness of search results was checked by telephone verification in each pilot HSO.

The chart shows the large seasonal increase in the value of subsidies at the beginning of the heating season and the corresponding fall at the end of the season. Subsidies for natural gas during the heating season were twice as large as subsidies for all other services combined. During the heating season (October through April), the monthly value of subsidies for natural gas ranged from 3.8 million hrn to 4.2 million hrn. In October and April, it fell to between 3 million hrn and 3.4 million hrn because in some regions the heating season begins in mid October and ends in mid April (see Chart 3.1). By comparison, monthly transfers from local budgets to cover subsidies for other services show little seasonal variation.

Chart 3.1: Monthly Values of Subsidies, 32 Pilot Raions, (000 Hrn)



Subsidies for the heating season of October 1997 through April 1998 were granted based on consumption norms (rather than actual consumption). For metered households, subsidies were recalculated later based upon the actual amount paid by households which households with meters were required to present to the housing subsidy office when they renewed their subsidies.

Table 3.1: Total Monthly Values of Subsidies, 32 Pilot Raions (000, Hrn)

No.	*Month*	*All Services*			*Gas Supply*			
		Number of Households	*Monthly Charges Based on Consumption Normative*	*Monthly Values of Subsidies*	*Number of Households*	*Monthly Charges Based on Consumption Normative*	*Monthly Values of Subsidies*	*Monthly Values of Subsidies for Services Excluding Natural Gas*
1	July 97	73,293.00	3,576.35	2,196.95	8,334.00	330.86	203.06	1,993.89
2	August 97	71,076.00	3,455.54	2,115.71	7,058.00	277.22	164.64	1,951.06
3	September 97	70,580.00	3,428.05	2,084.84	6,455.00	256.57	149.72	1,935.12
4	October 97	125,301.00	7,730.55	5,161.78	52,990.00	4,276.72	3,061.06	2,100.72
5	November 97	136,433.00	8,723.68	5,852.69	60,853.00	5,134.00	3,676.61	2,176.08
6	December 97	141,483.00	9,118.91	6,109.42	64,249.00	5,450.33	3,894.18	2,215.23
7	January 98	147,342.00	9,490.72	6,564.87	67,102.00	5,712.13	4,081.32	2,483.56
8	February 98	152,107.00	9,695.96	6,700.06	68,411.00	5,823.68	4,162.53	2,537.52
9	March 98	155,155.00	9,783.75	6,750.26	68,846.00	5,854.66	4,184.67	2,565.59
10	April 98	145,271.00	8,606.46	5,848.63	60,260.00	4,881.06	3,445.77	2,402.85
11	May 98	82,354.00	3,793.37	2,477.41	7,294.00	288.87	168.29	2,309.12
12	June 98	81,761.00	3,747.47	2,443.51	7,146.00	297.96	176.22	2,267.29

3.3 COMPARISON WITH YAHOTINSKY AND KAM'YANETS-PODILSKY RAIONS

For comparison, we also compiled separate tables (3.2 and 3.3) with data on gas consumption in Yahotynsky and Kam'yanets-Podilsky raions. In these raions, services are registered automatically when granting subsidies. The behavior of indicators is illustrated by Charts 3.2 and 3.3. As in the case of the 32 pilot raions, there is notable increase in consumption of natural gas during the heating season and relatively stable behavior of subsidies for other services (excluding natural gas). Since both are rural raions, the value of subsidies for these other services is relatively small as compared to the value of subsidies for natural gas.

Chart 3.2: Monthly Values of Housing Subsidies in Kam'yanets-Podilsky Raion (Hrn)

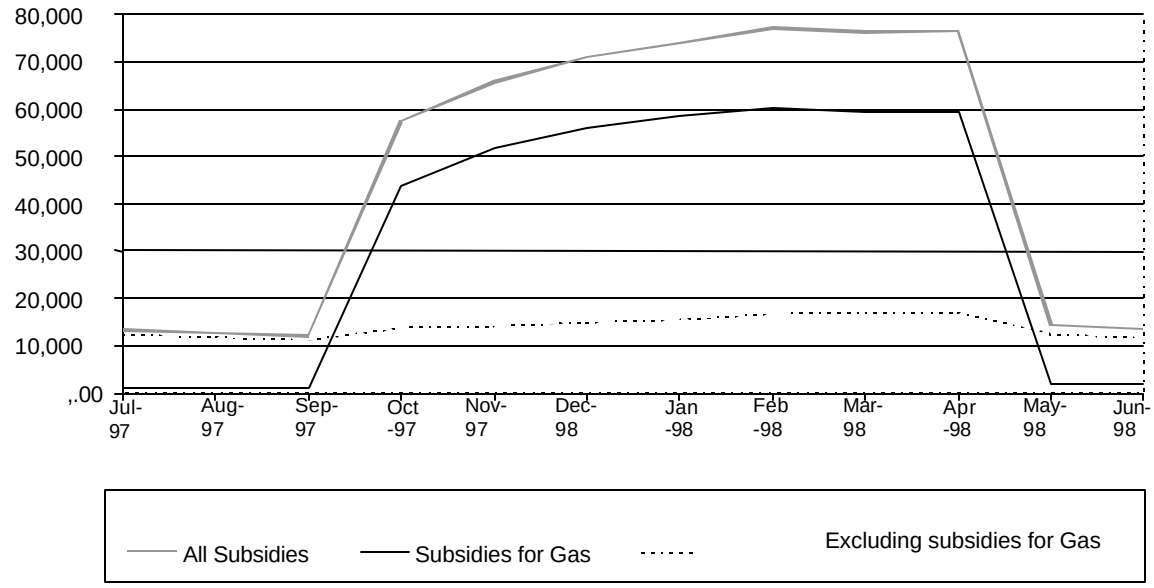


Chart 3.3: Monthly Values of Housing Subsidies Due in Yahotynsky Raion (Hrn)

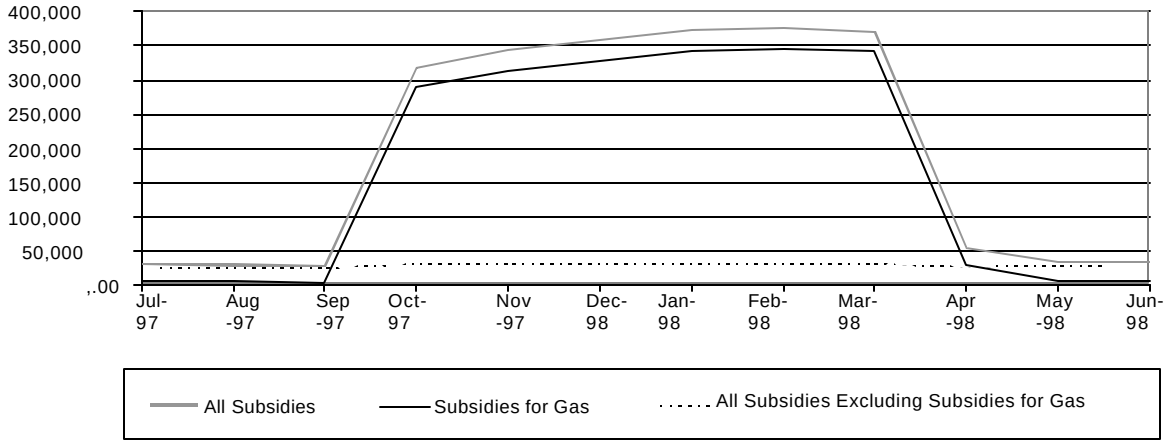


Table 3.2: Monthly Values of Subsidies in Kam'yanets-Podilsky Raion (Hrn)

		Subsidies for All Services		*Subsidies for Natural Gas*		*Monthly Values of Subsidies Excluding Natural Gas*
No.	*Month*	*Number of Households*	*Monthly Values of Subsidies*	*Number of Households*	*Monthly Values of Subsidies*	
1	July 97	468	13,410.70	111	1,066.73	12,343.97
2	August 97	440	12,779.36	87	970.18	11,809.18
3	September 97	413	12,072.88	68	909.10	11,163.78
4	October 97	1,218	57,369.67	844	43,570.07	13,799.60
5	November 97	1,359	65,706.37	986	51,570.68	14,135.69
6	December 97	1,427	70,911.47	1,056	55,997.43	14,914.04
7	January 98	1,480	74,051.98	1,103	58,564.83	15,487.15
8	February 98	1,542	76,997.31	1,133	60,241.03	16,756.28
9	March 98	1,546	76,314.27	1,126	59,427.71	16,886.56
10	April 98	1,544	76,506.95	1,125	59,450.90	17,056.05
11	May 98	481	14,307.49	94	1,831.52	12,475.97
12	June 98	461	13,438.68	87	1,829.23	11,609.45

Table 3.3: Monthly Values of Subsidies in Yahotynsky Raion (Hrn)

		Subsidies for All Services		*Subsidies for Natural Gas*		*Monthly Values of Subsidies Excluding Natural Gas*
No.	*Month*	*Number of Households*	*Monthly Values of Subsidies*	*Number of Households*	*Monthly Values of Subsidies*	
1	July 97	1,377	29,657.09	448	4,286.76	25,370.33
2	August 97	1,245	28,695.99	335	3,995.94	24,700.05
3	September 97	1,135	27,803.16	229	3,629.46	24,173.70
4	October 97	6,979	318,696.05	5,869	289,026.11	29,669.94
5	November 97	7,447	343,440.26	6,292	313,503.07	29,937.19
6	December 97	7,722	358,824.03	6,549	328,714.73	30,109.30
7	January 98	8,034	372,950.99	6,843	342,877.17	30,073.82
8	February 98	8,097	376,091.08	6,899	346,476.17	29,614.91
9	March 98	7,985	371,216.50	6,783	341,133.83	30,082.67
10	April 98	2,302	52,898.41	1,261	27,487.47	25,410.94
11	May 98	1,615	32,019.33	322	4,190.14	27,829.19
12	June 98	1,594	33,113.39	303	5,087.51	28,025.88

4. ESTIMATES OF NATIONWIDE BUDGET EXPENDITURES FOR SUBSIDIES FOR NATURAL GAS DURING THE HEATING SEASON

4.1 MAKING NATIONWIDE ESTIMATES FROM SAMPLE DATA

The sample data described in the preceding sections allow us to make estimates of what share of total monthly expenditures on subsidies nationwide. To do this, we have combined nationwide data on participation in the housing subsidy program and the total value of subsidies granted with estimates from the samples on the share of the total value that is attributable to subsidies for gas on heating.

Table 4.1 shows nationwide data on values of subsidies and number of subsidy recipients for the same period (July 1997 through June 1998). The data are taken from official reporting statistics. The total monthly values of subsidies due between July 1997 and June 1998 (excluding subsidies for natural gas) ranged from 55 million hrn to 65 million hrn.

Data in Table 4.2 are obtained by extrapolating subsidies for natural gas in pilot raions to the whole Ukraine. Chart 4.1, based on data in Table 4.1 shows monthly total values of subsidies and estimated values of subsidies for natural gas for Ukraine as a whole.

4.2 ESTIMATES OF TOTAL VALUE OF SUBSIDIES FOR GAS

During the heating season, the monthly values of subsidies for natural gas fell in the range of 97.5 million hrn to 99.9 million hrn. In October and April, they fell to between 70 million hrn and 80 million hrn because, in some regions, the heating season lasts from mid August through mid April (see Chart 5.1). The lower value of subsidies at the beginning of the heating season is explained by the fact that many subsidies for October are not granted and credited until November (according to Decree No.1050, Item 13, Paragraph 7).

Recipients of subsidies for natural gas (monthly value is 4.6 million hrn. to 7.3 million hrn during the year) include also households using gas only for cooking because their houses receive central heating). The value of subsidies to these households should be excluded from consideration of consumption of natural gas during the heating season since installation of gas meters in their housing would be hardly reasonable. Only households using natural gas for home heating can reasonably be expected to install meters (see attachment 2 to this report).

Subsidies for natural gas due between July 1997 and June 1998 totaled 647 million hrn. The value of subsidies for natural gas during the non-heating season was 27 million hrn., or an average of 5.45 million hrn per month. If we assume that the value of subsidies to these households during the heating season is for households using natural gas for heating, then the total value of subsidies for natural gas for the whole heating season 1997-98 would be around 581.6 million hrn.

If gas meters were installed, natural gas consumption would be reduced by 22.76 percent to 29.22 percent. These estimates are based on the experience of other countries (see above). This would allow a saving of between 23.1 percent to 28.6 percent in budget expenditures for subsidies for natural gas or be-

tween 415,288 thousand hrn and 447,336 thousand hrn. Therefore, budget savings during the heating season would be 134,229.87 thousand hrn to 166,347.99 thousand hrn.

Table 2.4 also shows the officially reported number of households enrolled in the HSP. On average, 2.815 million households receive subsidies during the non-heating season and 3.854 million households – during the heating season. The difference – 1.039 million households – are, we assume, those who use natural gas for home heating. If the cost of a gas meter and its installation is about 250 hrn, then the cost of installing gas meters by all enrolled households is 259.7 million hrn. The cost of meter installation could be repaid within two years from the reduction in monthly payments for natural gas.

Table 4.1: Total Value of Housing Subsidies, Nationwide*

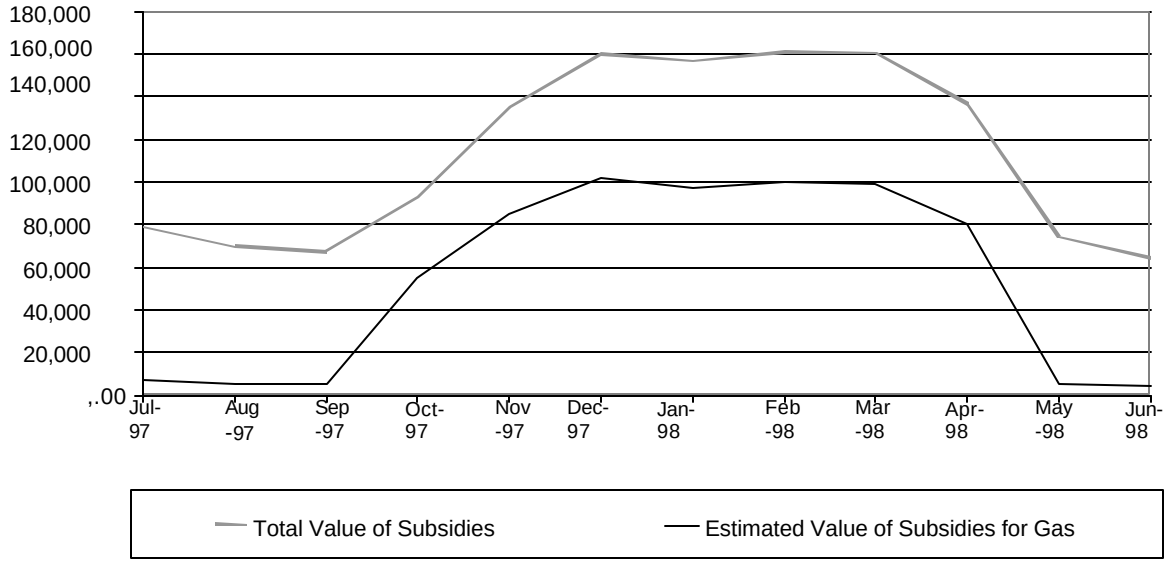
No.	*Month*	*Total Value of Subsidies for Housing and Communal Services (hrn)*	*Number of Households Enrolled in the HSP*
1	July 97	79,055.50	3,028,778
2	August 97	69,713.70	2,990,382
3	September 97	67,322.80	3,057,099
4	October 97	93,248.70	3,548,120
5	November 97	135,203.20	4,068,923
6	December 97	159,998.90	4,477,519
7	January 98	156,892.00	3,584,584
8	February 98	160,922.00	3,771,833
9	March 98	160,639.50	3,863,124
10	April 98	136,597.80	3,667,996
11	May 98	74,377.10	2,559,582
12	June 98	64,280.70	2,439,579
	Total	**1,358,251.90**	

* From monthly statistical reports on the housing subsidy program prepared by the State Committee for Statistics

Table 4.2: Estimated Values of Subsidies for Natural Gas, Nationwide (000 Hrn)

		Pilot Raions				*Ukraine As a Whole*		
No.	*Month*	*Total Value of Subsidies Granted*	*Value of Subsidies for Natural Gas*	*%*	*Total Value of Subsidies Except for Subsidies for Natural Gas*	*Total Value of Subsidies Granted*	*Estimated Value of Subsidies for Natural Gas*	*Estimated Value of Subsidies Except for Subsidies for Natural Gas*
1	July 97	2,196.95	203.06	9.24	1,993.89	79,055.50	7,307.08	71,748.42
2	August 97	2,115.71	164.64	7.78	1,951.06	69,713.70	5,425.08	64,288.62
3	September 97	2,084.84	149.72	7.18	1,935.12	67,322.80	4,834.63	62,488.17
4	October 97	5,161.78	3,061.06	59.30	2,100.72	93,248.70	55,298.77	37,949.93
5	November 97	5,852.69	3,676.61	62.82	2,176.08	135,203.20	84,933.49	50,269.71
6	December 97	6,109.42	3,894.18	63.74	2,215.23	159,998.90	101,984.39	58,014.51
7	January 98	6,564.87	4,081.32	62.17	2,483.56	156,892.00	97,538.16	59,353.84
8	February 98	6,700.06	4,162.53	62.13	2,537.52	160,922.00	99,975.79	60,946.21
9	March 98	6,750.26	4,184.67	61.99	2,565.59	160,639.50	99,584.88	61,054.62
10	April 98	5,848.63	3,445.77	58.92	2,402.85	136,597.80	80,477.90	56,119.90
11	May 98	2,477.41	168.29	6.79	2,309.12	74,377.10	5,052.46	69,324.64
12	June 98	2,443.51	176.22	7.21	2,267.29	64,280.70	4,635.77	59,644.93
	Total	54,306.13	27,368.09		26,938.04	1,358,251.90	647,048.41	711,203.49

Chart 4.1: EstimatedValues of Subsidies for Natural Gas Granted Nationwide (Thousand Hrn.)



PART II: OPTIONS FOR IMPLEMENTING INCENTIVES FOR METER INSTALLATION

This part of the report describes two ways of implementing incentives for households receiving housing subsidies to install gas meters.

ATTACHMENT 1. GAS HEATING NORMATIVES

Under Resolution No. 619 of the Cabinet of Ministers, issued on June 8, 1996, the consumption normatives for the use of natural gas for heating were changed. Instead of all households paying for each month during the year for 5 m^3 of gas for every m^2 of living space to be heated, they will pay for 11 m^3 of gas for every m^2 of living space to be heated during the heating season (for 7 months each year). During the remaining 5 months each year, households will pay for no natural gas for heating. The measure is effective from October 1, 1996.

This represents an increase of 28.33 percent in the amount of gas for which households will be required to pay for heating each year -- but an increase of 120 percent in monthly payments on October 1. In 1996, therefore, households will pay for a total of 78 m^3 of gas per m^2 of living space (9 months at 5 m^3 per m^2 and 3 months at 11 m^3 per m^2). This is an average of 6.5 m^3 per m^2. In 1997, households will be required to pay for a total of 77 m^3 of natural gas for every m^2 to be heated. This is an average of 6.42 m^3 per m^2.

This proposed increase in gas normatives and the switch to a seasonal payment system will create a crisis among rural households.

1) Since households cannot afford this increase, there will be many new applications for subsidies. The new normatives will mean a sudden and large increase in the monthly payments for heating for rural households on October 1, 1996, two months after the costs of other services have been increased from 60 percent to 80 percent cost recovery. For a family in a 50 m^2 apartment or rural home, monthly payments for heating will jump from 3,250 thousand krb in September to 7,150 thousand krb in October. The increase alone exceeds one-third of the average monthly wage. The increase in monthly payments will cause about 1.5 million new applications from households to apply for subsidies during the subsequent three months.

2) The increase in gas heating normatives will raise the monthly budget expenditures on housing subsidy payments by an estimated 6 trillion krb/month during each month in the heating season. Because households will be required to pay heating costs in seven months rather than spread over the whole year many new households will be eligible for housing subsidies. There will be a small offsetting decline in subsidy payments during the 5 month summer season in 1997. But between October 1 and April 31, the additional spending on subsidies because of the heating season normative will total about 30 trillion krb. The additional cost of the subsidy program in 1996 will exceed 10 trillion krb.

3) The seasonal heating payment system will overwhelm subsidy offices with new applicants after October 1 and will require the development of a separate record system (with separate computers) for households applying for subsidies because the procedure for granting subsidies will differ from the existing mechanism. Many households will be eligible for subsidies only during the heating season (which varies in different parts of Ukraine). While all other subsidies are granted for 6 months, the new households applying will be granted a subsidy only for the heating season.

ATTACHMENT 2:

The suggested surcharge may, in fact, be much less than what the family saves by reducing its monthly consumption below the normatives for which they are billed today. For instance, the rate of return from investing in the purchase and installation of a gas meter will reach almost 32 percent per year for a household currently charged for 19.7 cubic meters of gas per person a month if it can reduce its consumption of gas by 50 percent (that is, it will reduce its annual gas payments by $32). Table 2 summarizes the results of these computations.

Table 2
Monthly Savings in Dollars from the Reduced Consumption of Gas for Three-person Family Under Tariffs Equal to the World Price of Gas

Reduction in Family Per Capita Consumption of Gas	*10%*	*20%*	*30%*	*40%*	*50%*
	Monthly savings in US $[1]				
Users consuming 6.8 m^3 per person	0.18	0.36	0.54	0.72	0.9
Users consuming 11.4 m^3 per person	0.31	0.62	0.93	1.24	1.55
Users consuming 19.7 m^3 per person	0.53	1.06	1.59	2.12	2.65
Users in housing with gas heating 70 m^3 per person[2]	1.89	3.78	5.67	7.56	9.45

Notes:
1. The world price of gas is assumed to be US $90 per 1000 cubic meters of gas.
2. Currently households that use gas to heat their home pay for 5 m^3 which, assuming the average size family dwelling of 42 m^2, yields a normative of 70 m^3 per person.

However, Table 2 also shows that meters should not be installed everywhere -- especially since there will be, at most, 200,000 - 250,000 meters available each year from domestic producers (although there is an infinite supply through imports) for low-income households assisted through this program and for other households purchasing meters themselves. "The Concept for the Gradual Manufacture and Implementation of Residential Gas Meters" Regulation of the Cabinet of Ministers No. 422, June 14, 1995, calls for a program of phasing in meters based on establishing priorities among customers. This analysis may be useful for the Cabinet in identifying priority residential customers. It would be better to create a program aimed at installing meters in those houses that are both the largest users of gas and that have the greatest potential for conservation.

The order for priority installation should be:

1) Households that heat their homes with gas;
2) Households with gas water heaters;
3) Households without central hot water;
4) All other households.

Within each of these categories, large apartments and homes should be required to install meters first.